Mathematics - 0580

■ 23 Questions

Topics Covered :

✓ 1.8 - Standard form
✓ 1.1 - Types of number
✓ 1.3 - Powers and roots
✓ 1.7 - Indices I
✓ 2.5 - Equations
✓ 1.11 - Ratio and proportion
✓ 2.8 - Proportion
✓ 1.4 - Fractions, decimals and percentages
+ 4 more topics...

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Question No 1 - (0580_s24_22_10)

Subsection Topics: (10) : 1.8 - Standard form

Question No 2 - (0580_s24_22_1)

Subsection Topics: (1) : 1.1 - Types of number

The temperature at midnight is $-4\,^{\circ}\mathrm{C}$.
The temperature at noon is $25\,^{\circ}\mathrm{C}$.

Work out the difference between these two temperatures.

Question No 3 - (0580_s24_23_1)

Subsection Topics: (1) : 1.1 - Types of number

Write the number two million two thousand and two in figures.

..... [1]

Question No 4 - (0580_w24_21_2)

Subsection Topics: (2) : 1.3 - Powers and roots

Find the reciprocal of $1\frac{1}{4}$.

..... [1]

DO NOT WRITE IN THIS MA

Question No 5 - (0580_w24_22_3)

Subsection Topics: (3) : 1.1 - Types of number, 1.3 - Powers and roots

0.25	3.142	$\sqrt{3}$	-3	24	-0.4	1.2	$-\frac{1}{4}$

Complete each statement with a number from the list.

..... is a natural number.

..... is an irrational number.

..... is the reciprocal of 4.

[3]

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Question No 6 - (0580_w24_23_1)

Subsection Topics: (a) : 1.3 - Powers and roots | (b) : 1.1 - Types of number

61	62	63	64	65	66	67	68	69

From the list of numbers, write down

(a) a cube number

..... [1]

(b) a prime number.

..... [1]

Question No 7 - (0580_m23_22_8)

Subsection Topics: (8) : 1.8 - Standard form

Calculate 0.3^2 .
Give your answer in standard form.

..... [2]

Question No 8 - (0580_m23_22_1)

Subsection Topics: (a) : 1.1 - Types of number | (b) : 1.1 - Types of number

12	15	27	29	91	93

From the list of numbers, write down

(a) a cube number

..... [1]

(b) a prime number.

..... [1]

Question No 9 - (0580_s23_22_2)

Subsection Topics: (2) : 1.1 - Types of number

There are two prime numbers in this list.

27 47 57 61 75 93

Work out the sum of these two prime numbers.

..... [2]

Question No 10 - (0580_w23_22_9)

Subsection Topics: (9) : 1.1 - Types of number

Expand and simplify.

$$2(t+w)+3(w-t)$$

..... [2]

Question No 11 - (0580_w23_22_6)

Subsection Topics: (a) : 1.1 - Types of number | (b) : 1.1 - Types of number

(a) Explain why 111 is not a prime number.

..... [1]

(b) Find a prime number between 110 and 120.

..... [1]

Question No 12 - (0580_w23_23_2)

Subsection Topics: (a) : 1.1 - Types of number | (b) : 1.1 - Types of number

61	63	64	66	68	69

From this list, write down

(a) a cube number

..... [1]

(b) a prime number.

..... [1]

Question No 13 - (0580_w23_23_10)

Subsection Topics: (a) : 1.7 - Indices I | (b) : 1.7 - Indices I

$$\overrightarrow{AB} = \begin{pmatrix} 7 \\ -3 \end{pmatrix}$$

(a) Find $3\overrightarrow{AB}$.

$\begin{pmatrix} \quad \\ \quad \end{pmatrix}$ [1]

(b) Find $\left|\overrightarrow{AB}\right|$.

$\left|\overrightarrow{AB}\right| =$ ..... [2]

Question No 14 - (0580_s22_21_5)

Subsection Topics: (5) : 1.1 - Types of number

Kirsty changes \$380.80 into pounds (£) when £1 = \$1.19 .

Calculate the amount Kirsty receives.

£ ..... [2]

Question No 15 - (0580_s22_21_1)

Subsection Topics: (1) : 1.1 - Types of number

Write down a prime number between 30 and 40.

..... [1]

Question No 16 - (0580_s22_42_1)

Subsection Topics: (a) : 1.1 - Types of number | (b) : 1.11 - Ratio and proportion | (c) : 2.8 - Proportion | (d) : 1.4 - Fractions, decimals and percentages | (e) : 1.1 - Types of number

(a) Find the lowest common multiple (LCM) of 30 and 75.

.....

(b) Share \$608 in the ratio 4 : 5 : 7.

\$ ....

\$ ....

\$ ....

(c) Work out $\frac{6.39 \times 10^4}{2.45 \times 10^6}$.

Give your answer in standard form.

.....

(d) Write $0.\dot{2}\dot{7}$ as a fraction.

.....

(e) A stone has volume $45\,cm^3$ and mass 126 g.
Find the density of the stone, giving the units of your answer.

[Density = mass ÷ volume]

.....

Question No 17 - (0580_w22_21_1)

Subsection Topics: (1) : 1.1 - Types of number

Write down a common multiple of 18 and 24.

..... [1]

Question No 18 - (0580_w22_23_2)

Subsection Topics: (a) : 1.1 - Types of number | (b) : 1.1 - Types of number

120 121 149 164 216

From this list, write down

(a) a square number

..... [1]

(b) a cube number.

..... [1]

Question No 19 - (0580_w22_41_2)

Subsection Topics: (a) : 1.9 - Estimation | (b) : 1.1 - Types of number | (c) : 1.3 - Powers and roots | (d) : 2.8 - Proportion | (e) : 2.8 - Proportion | (f) : 1.4 - Fractions, decimals and percentages

(a) Write

(i) 2994.99 correct to the nearest 10,

.....

(ii) 0.983 correct to 1 decimal place,

.....

(iii) 2090 correct to 2 significant figures.

.....

(b) Write down a prime number between 90 and 100.

.....

(c) Write 2^{-6} as a fraction.

.....

(d) Write 0.007 01 in standard form.

.....

(e) Simplify $1.5 \times 10^{x} + 1.5 \times 10^{x-1}$ giving your answer in standard form.

.....

(f) Write $0.3\dot{7}$ as a fraction.
You must show all your working.

Question No 20 - (0580_w22_42_10)

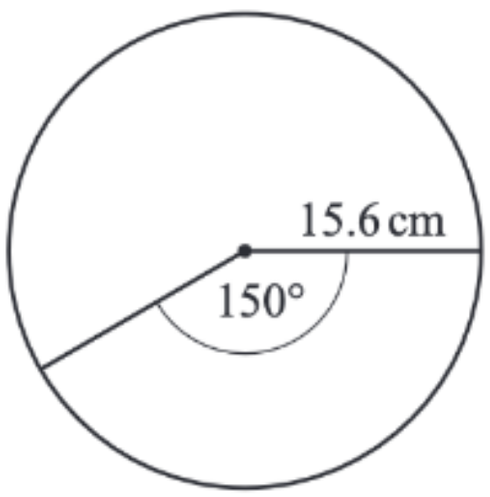
Subsection Topics: (a) : 1.1 - Types of number | (b) : 5.3 - Circles, arcs and sectors | (c) : 5.3 - Circles, arcs and sectors

(a) The lengths of the sides of a triangle are 11.4 cm, 14.8 cm and 15.7 cm, all correct to 1 decimal place.

Calculate the upper bound of the perimeter of the triangle.

..... cm [2]

(b)



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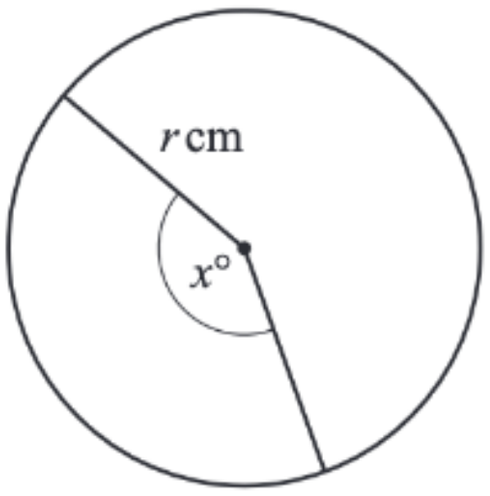
The diagram shows a circle, radius 15.6 cm.
The angle of the minor sector is 150°.

Calculate the area of the minor sector.

..... cm^2 [2]

(c)



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SCALE

The diagram shows a circle, radius r cm and minor sector angle $x°$.
The **perimeter** of the major sector is three times the **perimeter** of the minor sector.

Show that $x = \dfrac{90(\pi - 2)}{\pi}$.

[4]

Question No 21 - (0580_m21_22_22)

Subsection Topics: (a) : 1.1 - Types of number | (b) : 1.1 - Types of number

(a) A bag of rice has a mass of 25 kg, correct to the nearest kilogram.

Calculate the lower bound of the total mass of 10 of these bags.

..... kg [1]

(b) Virat has 200 metres of wire, correct to the nearest metre.
He cuts the wire into n pieces of length 3 metres, correct to the nearest 20 centimetres.

Calculate the largest possible value of n.

$n =$ ..... [3]

Question No 22 - (0580_s21_23_7)

Subsection Topics: (a) : 1.1 - Types of number | (b) : 1.1 - Types of number

12 18 29 49 91 125

From the list of numbers, write down

(a) a cube number,

..... [1]

(b) a prime number.

..... [1]

Question No 23 - (0580_s21_42_3)

Subsection Topics: (a) : 1.7 - Indices I | (b) : 1.7 - Indices I | (c) : 1.1 - Types of number | (d) : 2.2 - Algebraic manipulation | (e) : 2.5 - Equations

(a) Simplify, giving your answer as a single power of 7.

(i) $7^5 \times 7^6$

(ii) $7^{15} \div 7^5$

(iii) $42 + 7$

(b) Simplify.

$$(5x^2 \times 2xy^4)^3$$

(c) $P = 2^5 \times 3^3 \times 7$ $Q = 540$

(i) Find the highest common factor (HCF) of P and Q.

(ii) Find the lowest common multiple (LCM) of P and Q

(ii) Find the lowest common multiple (LCM) of P and Q.

(iii) $P \times R$ is a cube number, where R is an integer.

Find the smallest possible value of R.

(d) Factorise the following completely.

(i) $x^2 - 3x - 28$

(ii) $7(a+2b)^2 + 4a(a+2b)$

(e) $3^{2x-1} = \frac{1}{9^x} \times 3^{2y-x}$

Find an expression for y in terms of x.

Answer for Question 7 (0580_m23_22_8)

8	9×10^{-2}	**2**	**B1** for 0.09 oe or **M1** for *their* decimal correctly converted to standard form if negative power

Answer for Question 8 (0580_m23_22_1)

1(a)	27	**1**	
1(b)	29	**1**	

Answer for Question 9 (0580_s23_22_2)

2	108	**2**	**B1** for 47 or 61 identified

Answer for Question 10 (0580_w23_22_9)

9	$2 \times 3 \times 3 \times 5$ or $2 \times 3^2 \times 5$	**2**	**B1** for 2, 3, 3, 5 or **M1** for correct factor tree/diagram/list/table.

Answer for Question 11 (0580_w23_22_6)

6(a)	Multiple of 3 or multiple of 37	**1**	
6(b)	113	**1**	

Answer for Question 12 (0580_w23_23_2)

2(a)	64	**1**	
2(b)	61	**1**	

Answer for Question 13 (0580_w23_23_10)

10(a)	$\begin{pmatrix} 21 \\ -9 \end{pmatrix}$	**1**	
10(b)	7.62 or 7.615 to 7.616	**2**	**M1** for $(7)^2 + (-3)^2$ oe If 0 scored **SC1** for 22.8 or 22.84 to 22.85

Answer for Question 14 (0580_s22_21_5)

5	320	**2**	**M1** for 380.8 ÷ 1.19 oe

Answer for Question 15 (0580_s22_21_1)

1	31 or 37	**1**	

Answer for Question 16 (0580_s22_42_1)

1(a)	150	**2**	**B1** for answer $150k$ or **M1** for prime factors of 30 or 75 seen or a list of multiples of both 30 and 75 with at least 3 of each or for $\frac{30\times75}{15}$ oe or for answer $2 \times 3 \times 5^2$
1(b)	152 190 266	**3**	Accept in any order **B2** for two correct answers or **M1** for $\frac{608}{4+5+7}\times k$ oe where k =1, 4, 5, 7
1(c)	2.61×10^{-2} 2.61×10^{-2} or $2.608\ldots \times 10^{-2}$	**2**	**B1** for figs 2608 or 261 seen If 0 scored, **SC1** for answer $2.6[0] \times 10^{-2}$ without more accurate value in standard form seen
1(d)	$\frac{27}{99}$ oe fraction	**1**	
1(e)	2.8	**1**	
	g/cm^3 or $g\ cm^{-3}$	**1**	

Answer for Question 17 (0580_w22_21_1)

1	Any multiple of 72	**1**	

Answer for Question 18 (0580_w22_23_2)

2(a)	121	**1**	
2(b)	216	**1**	

Answer for Question 19 (0580_w22_41_2)

2(a)(i)	2990 cao	**1**	
2(a)(ii)	1.0 cao	**1**	
2(a)(iii)	2100 cao	**1**	
2(b)	97	**1**	
2(c)	$\frac{1}{64}$ final answer	**1**	
2(d)	$7.01[0] \times 10^{-3}$	**1**	
2(e)	1.65×10^{x}	**2**	**M1** for final answer figs 165 or for $15\times10^{x-1}$ seen or for 0.15×10^{x} seen
2(f)	$37.7... - 3.7... [= 34]$ oe	**M1**	
	$\frac{34}{90}$ oe fraction	**B1**	

Answer for Question 20 (0580_w22_42_10)

10(a)	42.05 final answer	**2**	**M1** for 11.4 + 0.05 oe or 14.8 + 0.05 oe or 15.7 + 0.05 oe
10(b)	319 or 318.5 to 318.6	**2**	**M1** for $\frac{150}{360}\times\pi\times15.6^2$ oe
10(c)	$\frac{360-x}{360}\times2\pi r+2r=3\left(\frac{x}{360}\times2\pi r+2r\right)$ oe	**M2**	**M1** for $\frac{x}{360}\times2\pi r$ oe seen or $\frac{360-x}{360}\times2\pi r$ oe seen
	$\frac{4x}{360}\times2\pi[r]=2\pi[r]-4[r]$ oe	**M1**	i.e. M mark for isolating and collecting terms in x
	Leading to $\frac{90(\pi-2)}{\pi}$	**A1**	With no errors or omissions

Answer for Question 21 (0580_m21_22_22)

22(a)	245	**1**	
22(b)	69 cao nfww	**3**	**M2** for $\frac{200+0.5}{3-0.1}$ oe or **M1** for 200 ± 0.5 oe or 3 ± 0.1 oe seen

Answer for Question 22 (0580_s21_23_7)

7(a)	125	**1**	
7(b)	29	**1**	

Answer for Question 23 (0580_s21_42_3)

3(a)(i)	7^{11} cao	**1**	
3(a)(ii)	7^{10} cao	**1**	
3(a)(iii)	7^{2} cao	**1**	If answers 11, 10 and 2 in **(a)** then allow **SC1** in this part
3(b)	$1000x^9y^{12}$ final answer	**3**	**B2** for correct answer seen or answer of the form $1000x^9y^k$ or $1000x^ky^{12}$ or kx^9y^{12} or **B1** for answer with one correct element in product or $(10x^3y^4)^{[3]}$ seen
3(c)(i)	108	**2**	**M1** for [540 =] 2^2 [×] 3^3 [×] 5 or **B1** for 108 oe not in prime factor form e.g. $2^2 \times 3 \times 9$

Answer for Question 23 (0580_s21_42_3)

3(c)(ii)	30 240	**2**	**M1** for $(540 \times 2^5 \times 3^3 \times 7) \div$ *their* **(c)(i)** oe or **B1** for answer 30 240 oe not in prime factor form e.g. $2^5 \times 3^3 \times 35$
3(c)(iii)	98	**2**	**B1** for 592 704 seen or $2^6 \times 3^3 \times 7^3$ seen or 2×7^2 oe seen
3(d)(i)	$(x - 7)(x + 4)$ final answer	**2**	**M1** for $x(x - 7) + 4(x - 7)$ or $x(x + 4) - 7(x + 4)$ or better or for $(x + a)(x + b)$ where $ab = -28$ or $a + b = -3$
3(d)(ii)	$(a + 2b)(11a + 14b)$ final answer	**2**	**M1** for $(a + 2b)(7(a + 2b) + 4a)$ or $(a + pb)(11a + qb)$ where $pq = 28$ or $11p + q = 36$ If 0 scored, **SC1** for $a + 2b\ (11a + 14b)$
3(e)	$[y =] \frac{5x-1}{2}$ oe final answer	**4**	**B2** for $2x - 1 = -2x + 2y - x$ oe or **B1** for $9^x = 3^{2x}$ or better **M1dep** for correct rearrangement of *their* 5 term 'linear' equation in y and x to make y the subject